

IN THE CLAIMS

Please cancel all claims pending to entry of the present amendment, 42, 47, and 48 through 81. Please add the following new claims 82 through 115. Thus, claims 82 through 115 are pending upon entry of this amendment.

Claims 1-81 (canceled)

Claim 82 (new): A cascade genetic circuit comprising one or more nucleic acid constructs that comprise the components:

- a) a gene encoding a Nah-R transcriptional regulator; wherein said Nah-R transcriptional regulator is responsive to one or more benzoate derivatives;
- b) a Psal promoter, wherein in the presence of at least one of said one or more benzoate derivatives, said Psal promoter is activated by said Nah-R transcriptional regulator;
- c) a gene encoding the XylS2 transcriptional regulator, wherein said gene encoding the XylS2 transcriptional regulator is regulated by said Psal promoter, and further wherein said XylS2 transcriptional regulator is responsive to at least one or said one or more benzoate derivatives; and
- d) a Pm promoter;
wherein said Pm promoter is responsive to said XylS2 transcriptional regulator.

Claim 83 (new): The cascade genetic circuit of claim 82, wherein said one or more nucleic acid constructs are provided in a prokaryotic cell.

Claim 84 (new): The cascade genetic circuit of claim 82, wherein at least one of said one or more nucleic acid constructs is provided in a plasmid that can replicate in gram negative bacteria.

Claim 85 (new): The cascade genetic circuit of claim 84, wherein at least one of said one or more nucleic acid constructs are provided in at least one plasmid that can promote the integration of at least one of said components of said cascade genetic circuit into the chromosome of said gram negative bacteria.

Claim 86 (new): The cascade genetic circuit of claim 82, wherein at least one of said one or more nucleic acid constructs is integrated into the chromosome of a gram negative bacteria.

Claim 87 (new): The cascade genetic circuit of claim 82, wherein said one or more nucleic acid constructs are two or more nucleic acid constructs.

Claim 88 (new): The cascade genetic circuit of claim 87, wherein said two or more nucleic acid constructs are two nucleic acid constructs.

Claim 89 (new): The cascade genetic circuit of claim 88, wherein said two nucleic acid constructs comprise:

- a) a first nucleic acid construct that comprises a regulatory cassette comprising said gene encoding a Nah-R transcriptional regulator, said Psal promoter, and said gene encoding said XylS2 transcriptional regulator, wherein said gene encoding said XylS2 transcriptional regulator is regulated by said Psal promoter; and
- b) a second nucleic acid construct that comprises an expression cassette comprising said Pm promoter.

Claim 90 (new): The cascade genetic circuit of claim 89, wherein said Pm promoter of said expression cassette is positioned upstream of and in proximity to one or more restriction sites, wherein the expression of a nucleic acid sequence cloned into at least one of said one or more restriction sites can be regulated by said Pm promoter.

Claim 91 (new): A prokaryotic cell comprising the cascade genetic circuit of claim 82.

Claim 92 (new): The prokaryotic cell of claim 91, wherein said prokaryotic cell is a gram negative bacterial cell.

Claim 93 (new): A cascade genetic circuit comprising one or more nucleic acid constructs that comprise the components:

- a) a gene encoding a Nah-R transcriptional regulator; wherein said Nah-R transcriptional regulator is responsive to one or more benzoate derivatives;
- b) a Psal promoter, wherein in the presence of at least one of said one or more benzoate derivatives, said Psal promoter is activated by said Nah-R transcriptional regulator;
- c) a gene encoding the XylS2 transcriptional regulator, wherein said gene encoding the XylS2 transcriptional regulator is regulated by said Psal promoter, and further wherein said XylS2 transcriptional regulator is responsive to at least one or said one or more benzoate derivatives;
- d) a Pm promoter;
wherein said Pm promoter is responsive to said XylS2 transcriptional regulator; and
- e) a nucleic acid sequence in proximity to said Pm promoter, wherein the expression of said nucleic acid sequence is regulated by said Pm promoter.

Claim 94 (new): The cascade genetic circuit of claim 93, wherein said nucleic acid sequence encodes a peptide.

Claim 95 (new): The cascade genetic circuit of claim 93, wherein said nucleic acid sequence encodes an antisense molecule, a ribozyme, an rRNA, a tRNA, an snRNA, or a diagnostic RNA molecule.

Claim 96 (new): The cascade genetic circuit of claim 93, wherein said Nah-R transcriptional regulator is a mutant form of Nah-R.

Claim 97 (new): The cascade genetic circuit of claim 96, wherein said mutant form of Nah-R is nahR3 or nahR4.

Claim 98 (new): A prokaryotic cell comprising the cascade genetic circuit of claim 93.

Claim 99 (new): The prokaryotic cell of claim 98, wherein said prokaryotic cell is a gram negative bacterial cell.

Claim 100 (new): The cascade genetic circuit of claim 93, wherein at least one of said one or more nucleic acid constructs is provided in a plasmid that can replicate in gram negative bacteria.

Claim 101 (new): The cascade genetic circuit of claim 100, wherein at least one of said one or more nucleic acid constructs are provided in at least one plasmid that can promote the integration of at least one of said components of said cascade genetic circuit into the chromosome of said gram negative bacteria.

Claim 102 (new): The cascade genetic circuit of claim 93, wherein at least one of said one or more nucleic acid constructs is integrated into the chromosome of a gram negative bacteria.

Claim 103 (new): The cascade genetic circuit of claim 93, wherein said one or more nucleic acid constructs are two or more nucleic acid constructs.

Claim 104 (new): The cascade genetic circuit of claim 103, wherein said two or more nucleic acid constructs are two nucleic acid constructs.

Claim 105 (new): The cascade genetic circuit of claim 104, wherein said two nucleic acid constructs comprise:

- a) a first nucleic acid construct that comprises a regulatory cassette comprising said gene encoding a Nah-R transcriptional regulator, said Psal promoter, and said gene encoding said XylS2 transcriptional regulator, wherein said gene encoding said XylS2 transcriptional regulator is regulated by said Psal promoter; and
- b) a second nucleic acid construct that comprises an expression cassette comprising said Pm promoter and said nucleic acid sequence in proximity to said Pm promoter.

Claim 106 (new): A prokaryotic cell comprising the cascade genetic circuit of claim 105.

Claim 107 (new): The prokaryotic cell of claim 106, wherein said prokaryotic cell is a gram negative bacterial cell.

Claim 108 (new): The prokaryotic cell of claim 107, wherein said prokaryotic cell is an E. coli cell.

Claim 109 (new): The prokaryotic cell of claim 107, wherein said prokaryotic cell is a *Pseudomonas putida* cell.

Claim 110 (new): A method inducing the expression of a nucleic acid sequence, comprising:

- a) providing or establishing the cascade genetic circuit of claim 93 in a gram negative bacteria; and
- b) contacting said gram negative bacteria with at least one benzoate derivative to induce the expression of said nucleic acid sequence.

Claim 111 (new): The method of claim 110, wherein said nucleic acid sequence encodes a polypeptide.

Claim 112 (new): The cascade genetic circuit of claim 93, wherein said nucleic acid sequence encodes an antisense molecule, a ribozyme, an rRNAm a tRNA, an snRNA, or a diagnostic RNA molecule.

Claim 113 (new): The method of claim 110, wherein said benzoate derivative is salicylate or a substituted salicylate molecule.

Claim 114 (new): The method of claim 110, wherein said gram negative bacteria is *E. coli*.

Claim 115 (new): The method of claim 110, wherein said gram negative bacteria is *Pseudomonas putida*.